RISK ASSESSMENT OF THE LENZ OIL SITE

March 13, 1995

MAI
6443 Lewis Road
Loveland, OH 45140-9175
513-583-1249

Because of concerns associated with exposure to chemical contaminants migrating from a nearby site, indoor air quality samples have been collected to assess the risks that might exist as a result of migration. Indoor air samples were collected with Summa Canisters and analyzed by gas chromatography. The following compounds were reported from indoor air quality samples: Propene, isobutane, 2-methyl-butane, ethanol, 2-methyl-1,3-butadiene, 1,3-pentadiene, and acetone (Table 1). Each of these compounds is reported as an estimated concentration indicated by a J qualifier. Of these compounds, only acetone has an USEPA established risk-based value that can be used in a quantitative assessment of risk. Acetone has a value for calculation of noncarcinogenic risks associated with oral ingestion (IRIS, 1994). Acetone is not listed as a carcinogenic compound and, therefore, can only be assessed for noncarcinogenic effects. See the Appendix for toxicity values associated with acetone.

In order to evaluate risks associated with the inhalation of acetone, a scenario for residential exposure through inhalation of acetone at the detected concentration was calculated using the following exposure parameters. All residents are assumed to remain in the house 24 hours per day, 350 days per year. Adult residents are assumed to live in the house for a duration of 30 years. Children age 0 to 6, and 6 to 18 are assumed to retain their residence for 6 and 12 years, respectively. Assumed inhalation rates for adults, children age 0 to 6, and children age 6 to 18 are 1.3 m^3/hour, 1.4 m^3/hour, and 1.7 m^3/hour, respectively.

Based on USEPA guidance, a noncarcinogenic risk value of 1.00E+0 is cause for concern. Calculated noncarcinogenic risk values are as follows. For residential exposure of individuals age 0 to 6, calculated noncarcinogenic risk is 7.67E-3, for residents age 6 to 18, calculated risk is 4.08E-3,

and for adult residents living in the house for 30 years, the associated risk is 1.53E-3. These levels are all below the risk levels of concern. See Table 2 for all applicable exposure assumptions. Risks associated with inhalation of acetone were calculated using the oral risk value due to lack of an inhalation value.

Acetone is a common laboratory contaminant and is not directly attributable to site activities. As shown by the risk calculations, no potential human health risks have been identified from detected chemical concentrations.

REFERENCES

Integrated Risk Information System. 1994-1995. On-line. USEPA Risk Data Base (updated monthly)

USEPA. 1989. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual Parts A, B, & C Interim Final. EPA/540/1-89/002, December

USEPA. 1992. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. OSWER Directive 9355.3-01. EPA/540/G-89/004, December.

TABLE 1

REPORTED CHEMICAL CONCENTRATIONS

Compound Name	CAS Registry Number	Average Estimated Concentration (ppbv)[a]	Qualifier[b]
Acetone	67-64-1	1.5	J
Ethanol	64-17-5	5	J
Isobutane	75-28-5	26.5	J
2-Methyl-1,3-butadiene	78-79-5	2	J
2-Methyl-butane	78-78-4	1	J
1,3-Pentadiene	1574-41-0	2	J
Propene	115-07-1	1.5	J

[a] ppbv part per billion volume

[b] Qualifier Estimated concentration assuming identical response factor to that of the internal standard with retention time closest to the TIC

TABLE 2

EXPOSURE SCENARIO ASSUMPTIONS AND CALCULATIONS

Exposure[1]	Current Resident		
	Adult	**Child age 0 to 6**	**Child age 6 to 18**
Contaminant Concentration in Air	3.57E-3 (mg/m^3)	3.57E-3 (mg/m^3)	3.57E-3 (mg/m^3)
Inhalation rate	1.3 (m^3/hour)	1.4 (m^3/hour)	1.7 (m^3/hour)
Exposure time	24 (hours/day)	24 (hours/day)	24 (hours/day)
Exposure frequency	350 (days/year)	350 (days/year)	350 (days/year)
Exposure duration	30 (years)	6 (years)	12 (years)
Body weight	70 (kg)	15 (kg)	36 (kg)
Averaging time	10950 (days)	2190 (days)	4380 (days)
Risk	1.53E-3	7.67E-3	4.08E-3

$$\text{Intake (mg/kg-day)} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

Risk = intake / RfD

Oral RfD for acetone = 1.00E-1 (mg/kg-day)

[1]All nonsite-specific assumptions from USEPA/RAGS 12/89 or OSWER Dir. Supplement or USEPA, DEA 12/92.

APPENDIX

(IRIS Files)

Chemical Name	acetone	AWQC_HH_Water/Fish (ug/L)	
CAS Registry Number	67-64-1	AWQC_HH_Water/Fish Commnt	NA
SC Oral RfD mg/kg-day	1.00E+00	AWQC_HH_Fish Only (ug/L)	
SC Oral RfD Source	HEAST (07/93)	AWQC_HH_Fish Only Comment	NA
C Oral RfD mg/kg-day	1.00E-01	AWQC_AO_FreshAcute (ug/L)	
C Oral RfD Comment	NC	AWQC_AO_FreshAcute Commnt	NA
C Oral RfD Source	IRIS (1994)	AWQC_AO_FreshChron (ug/L)	
SC Inhal RfC mg/m3		AWQC_AO_FresnChron Commnt	NA
SC Inhal RfC Source	NA	AWQC_AO_MarineAcut (ug/L)	
C Inhal RfC mg/m3		AWQC_AO_MarineAcut Commnt	NA
C Inhal RfC Comment	NC	AWQC_AO_MarineChrn (ug/L)	
C Inhal RfC Source	NA	AWQC_AO_MarineChrn Commnt	NA
Weight-of-Evidence Class	D		
Weight-of-Evidence Source	IRIS (1994)		
Oral SF kg-day/mg			
Oral Slope Factor Comment	NC		
Oral Slope Factor Source	NA		
Oral Unit Risk (ug/L)-1			
Oral Unit Risk Comment	NC		
Oral Unit Risk Source	NA		
Inhal SF kg-day/mg			
Inhal SF Comment	NC		
Inhal SF Source	NA		
Inhal Unit Risk (ug/m3)-1			
Inhal Unit Risk Comment	NC		
Inhal Unit Risk Source	NA		
PRG_Rsdntl_Water_CA mg/L			
PRG_Rsdntl_Water_NC mg/L	3.65E+00		
PRG_Rsdntl_Soil_CA mg/kg			
PRG_Rsdntl_Soil_NC mg/kg	2.70E+04		
1-day HA Child (mg/L)			
1-day HA Child Comment	NA		
10-day HA Child (mg/L)			
10-day HA Child Comment	NA		
Long-term HA Child (mg/L)			
Long-term HA Child Commnt	NA		
Long-term HA Adult (mg/L)			
Long-term HA Adult Commnt	NA		
Lifetime HA (mg/L)			
Lifetime HA Comment	NA		
DWEL (mg/L)			
DWEL Comment	NA		
MCLG (mg/L)			
MCLG Comment	NA		
MCLG Reference	NA		
MCL (mg/L)			
MCL Comment	NA		
MCL Reference	NA		
SMCL (mg/L)			
SMCL Reference	NA		

0128
Acetone: CASRN 67-64-1 (01/01/94)

Health risk assessment information on a chemical is included in IRIS only after a comprehensive review of chronic toxicity data by work groups composed of U.S. EPA scientists from several Program Offices. The summaries presented in Sections I and II represent a consensus reached in the review process. The other sections contain U.S. EPA information which is specific to a particular EPA program and has been subject to review procedures prescribed by that Program Office. The regulatory actions in Section IV may not be based on the most current risk assessment, or may be based on a current, but unreviewed, risk assessment, and may take into account factors other than health effects (e.g., treatment technology). When considering the use of regulatory action data for a particular situation, note the date of the regulatory action, the date of the most recent risk assessment relating to that action, and whether technological factors were considered. Background information and explanations of the methods used to derive the values given in IRIS are provided in the five Background Documents in Service Code 5, which correspond to Sections I through V of the chemical files.

STATUS OF DATA FOR Acetone

File On-Line 03/31/87

Category (section)	Status	Last Revised
Oral RfD Assessment (I.A.)	on-line	08/01/93
Inhalation RfC Assessment (I.B.)	no data	
Carcinogenicity Assessment (II.)	on-line	12/01/90
Drinking Water Health Advisories (III.A.)	no data	
U.S. EPA Regulatory Actions (IV.)	on-line	01/01/92
Supplementary Data (V.)	no data	

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I. CHRONIC HEALTH HAZARD ASSESSMENTS FOR NONCARCINOGENIC EFFECTS

I.A. REFERENCE DOSE FOR CHRONIC ORAL EXPOSURE (RfD)

Substance Name -- Acetone
CASRN -- 67-64-1
Last Revised -- 08/01/93

The Reference Dose (RfD) is based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis, but may not exist for other toxic effects such as carcinogenicity. In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Please refer to Background Document 1 in Service Code 5 for an elaboration of these concepts. RfDs can also be derived for the noncarcinogenic health effects of compounds which are also carcinogens. Therefore, it is essential to refer to other sources of information concerning the carcinogenicity of this substance. If the U.S. EPA has evaluated this substance for potential human carcinogenicity, a summary of that evaluation will be contained in Section II of this file when a review of that evaluation is completed.

NOTE: The Oral RfD for acetone may change in the near future pending the outcome of a further review now being conducted by the RfD/RfC Work Group.

I.A.1. ORAL RfD SUMMARY

Critical Effect	Experimental Doses*	UF	MF	RfD
Increased liver and kidney weights and nephrotoxicity Rat Oral Subchronic Study	NOEL: 100 mg/kg/day LOAEL: 500 mg/kg/day	1000	1	1E-1 mg/kg/day

U.S. EPA, 1986

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*Conversion Factors: Actual dose tested

__I.A.2. PRINCIPAL AND SUPPORTING STUDIES (ORAL RfD)

U.S. EPA. 1986. Ninety-day gavage study in albino rats using acetone. Office of Solid Waste, Washington, DC.

Acetone was administered by gavage for 90 days to groups of albino rats (30/sex/group) at 0, 100, 500, or 2500 mg/kg/day. Body weights, food consumption, clinical chemistry, hematology, and histopathologic parameters, as well as organ weights and organ-to-body weight ratios, were measured and analyzed. Animals were sacrificed after 30 or 90 days of exposure. No effects were seen at the 100 mg/kg/day dose level throughout the study. RBC parameters were significantly increased in the 2500-mg/kg/day group at 30 days (males only) and at 90 days in males and females. Statistical analysis of the absolute and relative organ weight data revealed significantly increased kidney weights for females in the 500- and 2500-mg/kg/day groups and increased kidney-to-body and brain weight ratios for males and females in the 2500-mg/kg/day groups. Liver weight and liver/body weight ratios were also increased in the 2500-mg/kg/day males and females. Histopathologic studies revealed a marked increase in severity in tubular degeneration of the kidneys and hyaline droplet accumulation with increasing doses. This accumulation was significant in the 500- and 2500-mg/kg/day males and the 2500 mg/kg/day females.

Based on the above findings, the NOEL for this study is 100 mg/kg/day and the LOAEL is 500 mg/kg/day based on increased liver and kidney weights and nephrotoxicity.

__I.A.3. UNCERTAINTY AND MODIFYING FACTORS (ORAL RfD)

UF -- An uncertainty factor of 1000 is used: 100 for inter- and intraspecies extrapolation and 10 to extrapolate from subchronic to chronic exposure.

MF -- None

I.A.4. ADDITIONAL COMMENTS (ORAL RfD)

Limited human studies have shown that workers exposed to acetone vapors (600 to 2150 ppm) experienced transient eye and nose irritation. Animals exposed to acetone vapors at 45,134 mg/cu.m experienced slight, but not significant, decreases in organ and body weights.

I.A.5. CONFIDENCE IN THE ORAL RfD

Study -- Medium
Data Base -- Low
RfD -- Low

Confidence in the principal study is rated medium, since a moderate number of animals/dose/sex and an extensive number of parameters were measured. The data base is rated low because a very limited number of studies are available and no pertinent supporting studies were located. The overall confidence rating for the RfD is low.

I.A.6 EPA DOCUMENTATION AND REVIEW OF THE ORAL RfD

Source Document -- This assessment is not presented in any existing U.S. EPA document.

Other EPA Documentation -- None

Agency Work Group Review -- 12/18/85, 05/30/86, 07/21/93

Verification Date -- 05/30/86

I.A.7. EPA CONTACTS (ORAL RfD)

Harlal Choudhury / OHEA -- (513)569-7553

W. Bruce Peirano / OHEA -- (513)569-7540

I.B. REFERENCE CONCENTRATION FOR CHRONIC INHALATION EXPOSURE (RfC)

Substance Name -- Acetone
CASRN -- 67-64-1

Not available at this time.

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II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Acetone
CASRN -- 67-64-1
Last Revised -- 12/01/90

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- D; not classifiable as to human carcinogenicity

Basis -- Based on lack of data concerning carcinogenicity in humans or animals.

II.A.2. HUMAN CARCINOGENICITY DATA

None.

II.A.3. ANIMAL CARCINOGENICITY DATA

None.

II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Acetone did not show mutagenic activity when tested in Salmonella typhimurium strains TA98 and TA100 or in Schizosaccharomyces pombe strain P1 either in the presence or absence of liver homogenates (McCann et al., 1975; Abbondandolo et al., 1980; Maron et al., 1981; Hallstrom et al., 1981) or in cell transformation systems (Freeman et al., 1973; Rhim et al., 1974; Quarles et al., 1979a,b). Furthermore, acetone gave negative results in assays for chromosomal aberrations and sister chromatid exchange (Norppa et al., 1981; Norppa, 1981; Tates and Kriek, 1981), DNA binding (Kubinski et al., 1981), point mutation in mouse lymphoma cells (Amacher et al., 1980), and transfection of E. coli CR63 cells (Vasavada and Padayatty, 1981). In one study, however, acetone was reported to produce chromosomal aberrations but not sister chromatid exchanges (Kawachi et al., 1980).

II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

None.

__II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

None.

__II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

___II.D.1. EPA DOCUMENTATION

Source Document -- U.S. EPA, 1988

The 1988 updated Health Effects Document for Acetone has received Agency review and is approved for publication.

___II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

Agency Work Group Review -- 12/06/89

Verification Date -- 12/06/89

___II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Charles Ris / OHEA -- (202)260-5895

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_III. HEALTH HAZARD ASSESSMENTS FOR VARIED EXPOSURE DURATIONS

__III.A. DRINKING WATER HEALTH ADVISORIES

Substance Name -- Acetone
CASRN -- 67-64-1

Not available at this time.

__III.B. OTHER ASSESSMENTS

Substance Name -- Acetone
CASRN -- 67-64-1

Content to be determined.

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_IV. U.S. EPA REGULATORY ACTIONS

Substance Name -- Acetone
CASRN -- 67-64-1
Last Revised -- 01/01/92

EPA risk assessments may be updated as new data are published and as assessment methodologies evolve. Regulatory actions are frequently not updated at the same time. Compare the dates for the regulatory actions in this section with the verification dates for the risk assessments in sections I and II, as this may explain inconsistencies. Also note that some regulatory actions consider factors not related to health risk, such as technical or

economic feasibility. Such considerations are indicated for each action. In addition, not all of the regulatory actions listed in this section involve enforceable federal standards. Please direct any questions you may have concerning these regulatory actions to the U.S. EPA contact listed for that particular action. Users are strongly urged to read the background information on each regulatory action in Background Document 4 in Service Code 5.

__IV.A. CLEAN AIR ACT (CAA)

No data available

__IV.B. SAFE DRINKING WATER ACT (SDWA)

No data available

__IV.C. CLEAN WATER ACT (CWA)

No data available

__IV.D. FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)

No data available

__IV.E. TOXIC SUBSTANCES CONTROL ACT (TSCA)

No data available

__IV.F. RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

___IV.F.1. RCRA APPENDIX IX, for Ground Water Monitoring

Status -- Listed

Reference -- 52 FR 25942 (07/09/87)

EPA Contact -- RCRA/Superfund Hotline
(800)424-9346 / (202)260-3000 / FTS 260-3000

__IV.G. SUPERFUND (CERCLA)

___IV.G.1. REPORTABLE QUANTITY (RQ) for Release into the Environment

Value (status) -- 5000 pounds (Final, 1985)

Considers technological or economic feasibility? -- NO

Discussion -- The final adjusted RQ for acetone is 5000 pounds, based on the application of the secondary criterion of biodegradation to the primary criteria RQ of 1000 pounds, determined by ignitability. Available data indicate a flash point of -4F and a boiling point of 133F, which corresponds to an RQ of 1000 pounds. The final RQ takes biodegradation into account, since acetone biodegrades when released into the environment. The biological oxygen demand for 5 days (BOD5) is 46-55%.

Reference -- 50 FR 13456 (04/04/85); 54 FR 33418 (08/14/89)

EPA Contact -- RCRA/Superfund Hotline
(800)424-9346 / (202)260-3000 / FTS 260-3000

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_V. SUPPLEMENTARY DATA

Substance Name -- Acetone
CASRN -- 67-64-1

Not available at this time.

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_VI. BIBLIOGRAPHY

Substance Name -- Acetone
CASRN -- 67-64-1
Last Revised -- 07/01/90

__VI.A. ORAL RfD REFERENCES

U.S. EPA. 1986. Ninety-day gavage study in albino rats using acetone. Office of Solid Waste, Washington, DC.

__VI.B. INHALATION RfD REFERENCES

None

VI.C. CARCINOGENICITY ASSESSMENT REFERENCES

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Tates, A.D. and E. Kriek. 1981. Induction of chromosomal aberrations and sister-chromatid exchanges in Chinese hamster cells in vitro by some proximate and ultimate carcinogenic arylamide derivatives. Mutat. Res. 88: 397-410.

Vasavada, H.A. and J.D. Padayatty. 1981. Rapid transfection assay for screening mutagens and carcinogens. Mutat. Res. 91: 9-14.

U.S. EPA. 1988. Updated Health Effects Assessment for Acetone. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste and Emergency Response, Washington, DC.

VI.D. DRINKING WATER HA REFERENCES

None

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VII. REVISION HISTORY

Substance Name -- Acetone

CASRN -- 67-64-1

Date	Section	Description
03/01/88	I.A.5.	Confidence levels revised
07/01/89	VI.	Bibliography on-line
01/01/90	II.	Carcinogen assessment now under review
07/01/90	II.	Carcinogen assessment on-line
07/01/90	IV.F.1.	EPA contact changed
07/01/90	VI.C.	Carcinogen references added
12/01/90	I.A.2.	Text edited
12/01/90	I.A.7.	EPA contacts changed
12/01/90	II.A.4.	Text edited
01/01/92	IV.	Regulatory actions updated
08/01/93	I.A.	Oral RfD noted as pending change
08/01/93	I.A.6.	Work group review date added

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SYNONYMS

Substance Name -- Acetone
CASRN -- 67-64-1
Last Revised -- 03/31/87

67-64-1
ACETON
Acetone
DIMETHYLFORMALDEHYDE
DIMETHYLKETAL
DIMETHYL KETONE
KETONE, DIMETHYL
KETONE PROPANE
beta-KETOPROPANE
METHYL KETONE
PROPANONE

2-PROPANONE
PYROACETIC ACID
PYROACETIC ETHER
RCRA WASTE NUMBER U002
UN 1090